A RESOLUTION BY

CITY UTILITIES COMMITTEE

02- R -0972

A RESOLUTION AUTHORIZING THE MAYOR OR DESIGNEE TO APPROVE A NOTICE TO PROCEED WITH JORDAN, JONES AND GOULDING, INC./ENGINEERING DESIGN TECHNOLOGIES, INC., - JV FOR FC-6710-96D, ANNUAL CONTRACT FOR ARCHITECTURAL AND ENGINEERING SERVICES TO PERFROM A PROCESS CAPACITY ANALYSIS OF THE THREE (3) CITY NPDES PERMITTED WATER RECLAMATION CENTERS ON BEHALF OF THE DEPARTMENT OF PUBLIC WORKS IN AN AMOUNT NOT TO EXCEED FIVE HUNDRED FIFTY THOUSAND DOLLARS ($550,000.00); ALL CONTRACTED WORK SHALL BE CHARGED TO AND PAID FROM FUND, ACCOUNT AND CENTER NUMBER: 2J21 524001 M57201.

WHEREAS, the City of Atlanta did enter into FC-6710-96D, Annual Contract for Architectural and Engineering Services; and

WHEREAS, the Department of Public Works does require Architectural and Engineering Services for an capacity analysis for R. M. Clayton, South River and Utoy Creek Water Reclamation Centers; and

WHEREAS, the Commissioner of the Department of Public Works and the Purchasing Agent have recommended that Jordan, Jones and Goulding, Inc./Engineering Design Technologies, Inc., - JV, to perform a process capacity analysis for R. M. Clayton, South River and Utoy Creek WRC's; and

NOW THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF ATLANTA, GEORGIA, that the Mayor be and is hereby authorized to approved Notice To Proceed with Jordan, Jones, and Goulding, Inc./Engineering Design Technologies, Inc., JV for FC-6710-96D, Annual Contract for Architectural and Engineering Services in an amount not to exceed Five Hundred Fifty Thousand Dollars ($550,000.00); and

BE IT FURTHER RESOLVED, that the Purchasing Agent be and is hereby directed to prepare an appropriate contractual agreement for execution by the Mayor, to be approved by the City Attorney as to form.

BE IT FURTHER RESOLVED, that this Notice to Proceed should not become binding on the City, and the City shall incur no liability upon same until such contract has been executed by the Mayor and delivered to the contracting party.

BE IT FINALLY RESOLVED, that all services for said Notice to Proceed shall be charged to and paid from fund, account and center number: 2J21 524001 M57201.

KOB (5/28/02)

CITY OF ATLANTA

SHIRLEY FRANKLIN
MAYOR

TECHNICAL SERVICES
2440 BOLTON ROAD, N.W.
ATLANTA, GEORGIA 30318
404 – 350-4950
FAX: 404 – 350-4951

DEPARTMENT OF PUBLIC WORKS
NORMAN KOPLON, P.E.
INTERIM COMMISSIONER

DAVID PETERS, P.E.,
ACTING DEPUTY COMMISSIONER

JOHN W. GRIFFIN, JR.
DEPUTY COMMISSIONER

GARNEY INGRAM-REID
DEPUTY COMMISSIONER

MEMORANDUM

DATE: May 17, 2002

TO: Felicia Strong-Whitaker, Director
Bureau of Purchasing and Real Estate

FROM: Bob King, Director
Wastewater Services

Bob N. King

REF: Proposal for Process Capacity Analysis for the R.M. Clayton, South River, and the Utoy Creek Water Reclamation Centers.

Enclosed is the proposal for JJ&G to perform a process capacity analysis of the three (3) City NPDES permitted water reclamation centers under their current blanket-engineering contract. Starting in 2004, the City will have to meet stricter NPDES effluent permit limits for total suspended solids, BOD5, phosphorous, ammonia, dissolved oxygen, fecal coliforms and organic nitrogen discharged from the R.M. Clayton, South River, and Utoy Creek Water Reclamation Centers. This change in the NPDES effluent permit is due to an ongoing assessment of the Chattahoochee river basin by EPD. EPD has determined that the pollutant loads must be further reduced to account for a deficit of oxygen in the river and maintain control of phosphorus going to West Point Lake. As result of this modeling, stricter NPDES permit limits are being applied to all wastewater facilities discharging into the Chattahoochee, which includes the three City of Atlanta water reclamation centers. The new NPDES permit limits are further influenced by Georgia Senate Bill 130, which created the Metropolitan North Georgia Water Quality district to perform regional planning for wastewater, water and storm water management. These new NPDES permit limits will become part of the district's wastewater plan, which the City must comply with. Cost of the project will be $550,000, which represents a significant drop in cost from the original estimated cost of 1.4 million dollars due to the City engineering staff performing a portion of the project workload. Cost is to be funded from 2J21, Center M57201

Technical Services, Account 524001 Consultant, Professional Services. To be able to get a capital improvement schedule for the 2004 permit application due the end of this year, I need a notice to proceed by 7/01/02. I would appreciate any help you can give to expedite this RFP. Thank you.

Cc: Keith Brooks
Seion Kelley
Bea Shell
David Peters, P.E.
Marcia Hurd Wade
Shamsh Jaffer
John Reinhard, P.E.
Mesut Sezgin, P.E.
Mike Smith
Mike Shelhamer
Tony Richardson
File - E109AF

JORDAN
JONES &
GOULDING
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Norcross, Georgia 30071
T 770.455.8555
F 770.455.7391
www.jjg.com

May 17, 2002

Mr. John D. Reinhard, P.E., CCS
Civil Engineer, Chief
City of Atlanta Wastewater Services
2440 Bolton Road, N.W.
Atlanta, Georgia 30318

RE: Engineering Services Proposal in response to City of Atlanta's *Technical Specifications for Process Capacity Analysis for the R.M. Clayton, South River, and the Utoy Creek WRCs*

Dear Mr. Reinhard:

Jordan, Jones & Goulding, Inc. / Engineering Design Technologies (JJG/EDT) is pleased to submit this proposal to the City of Atlanta (City) to provide all labor, equipment, and material to conduct Process Capacity Analyses for the aforementioned Water Reclamation Centers (WRCs). We have outlined, in Attachment 1, JJG/EDT's understanding of the scope of work and the proposed technical approach, schedule, project team, and cost. Attachment 2 is an example of JJG's custom spreadsheet model that JJG has been using for various plant process capacity evaluations.

We understand this proposal, if accepted, will be incorporated into a Task Order under the General Services Agreement FC-6710-96D. Our contract was amended for an extension to July 31, 2002; therefore, this task order will need to be authorized by the Mayor and City Council and issued by the Bureau of Purchasing and Real Estate prior to that date. Any work authorized prior to July 31 may continue until completed.

JORDAN
JONES &
GOULDING

Thank you for the opportunity for JJG/EDT to present our technical approach to meet the City's needs. We look forward to continuing the collaborative relationship between the City of Atlanta and JJG/EDT. Please call if you have any questions, or if additional information is needed.

Sincerely,

JORDAN, JONES & GOULDING, INC.

JC Lan

J.C. Lan, P.E.
Manager of Wastewater Treatment Discipline

Attachments

cc: Mr. George Barnes, P.E. – JJG
Mr. Haywood Curry, President - EDT

ATTACHMENT 1
JORDAN, JONES, & GOULDING, INC. (JJG)
ENGINEERING DESIGN TECHNOLOGIES (EDT)
ENGINEERING SERVICES PROPOSAL for
TECHNICAL SPECIFICATIONS FOR PROCESS CAPACITY ANALYSIS FOR THE R.M. CLAYTON, SOUTH RIVER AND THE UTOY CREEK WRCS

Project Understanding

JJG/EDT, with assistance from the City, will prepare the process capacity analysis and hydraulic models and the mass balances for the South River, Intrenchment Creek, Utoy Creek, and R.M. Clayton WRCs. The City will provide existing NPDES discharge monitoring reports, sludge records, Design Development Reports, as-built or design drawings, and daily operating logs for the separate facilities. Additional information, such as wastewater sampling and analysis, will be collected and analyzed by JJG/EDT in coordination with the City.

The scope of work will include evaluations of the unit processes at the four facilities.

At the end of the project, JJG/EDT will deliver the calibrated BioWin, hydraulic, mass balance, and process capacity analysis models to the City. These deliverables will be technical packages specific to each facility for the City Wastewater Services Technical Services Staff to forecast the capacity performance of each WRC from changes in influent flow rates, influent waste characteristics, number of process units in service, environmental conditions, plant operations, and effluent permit limits.

In addition, the modeling packages will be used to determine and schedule the operational, maintenance, and capital changes necessary to meet proposed NPDES metro effluent limits for 2004.

JJG/EDT will conduct workshops for the Technical Services Staff at major milestones of the project, such as the selection of inputs for the models, the development/start-up of field and laboratory studies, and the analysis and modeling, to provide training of the City staff.

JJG/EDT also assumes the receipt of Brown & Caldwell's summary report on the Phase 1 tasks of its R.M. Clayton WRC Capacity Analysis, as described in Brown & Caldwell's proposal to the City. The input parameters from the Brown & Caldwell modeling task will be required for JJG/EDT to calibrate the BioWin model for R.M. Clayton WRC.

Technical Approach

JJG/EDT will prepare a process model, mass balance, and hydraulic model for each of the four facilities. (Intrenchment Creek WRC will be considered as preliminary treatment to South River WRC). The process models will be used to assess performance of unit processes under various incoming and operating parameters, resulting in an understanding of the overall capacity of the plants and the processes themselves. The hydraulic model will be used to assess the hydraulic capacity of the plants and to evaluate the potential to increase the hydraulic capacity by making relatively minor changes. The mass balances will summarize runs of the process and hydraulic models.

Process Models

Wastewater treatment plant process design, particularly for biological processes, is more complex than it once was. Today, in addition to biochemical oxygen demand (BOD) removal, the activated sludge process is being used to remove nitrate, ammonia, and phosphorus. For example, the City's R.M. Clayton WRC, which was originally constructed in 1938, has evolved into a state-of-the-art facility. The plant is now configured to operate in one of several three-stage enhanced biological phosphorus removal (EBPR) processes. The City also practices chemical phosphorus removal by adding a metal salt to the activated sludge process at several of the plants. JJG/EDT will model the treatment process mode implemented at each of the WRCs.

Process modeling is the art of predicting performance of treatment processes under a given set of conditions. There are two general approaches to process modeling: 1) use of a commercial model, and 2) use of a custom spreadsheet model.

For many projects, JJG/EDT has used a custom spreadsheet model to simulate wastewater treatment process performance. An example of such a spreadsheet is provided as Attachment 2. In many cases, this is the best approach due to faster implementation. However, due to the complexity of EBPR, it is impractical to simulate these processes using a spreadsheet. There are two dominant commercial models: BioWin32 (by EnviroSim Associates[1]) and GPS-X (by Hydromantis). JJG/EDT uses BioWin32.

BioWin is used for simulating activated sludge processes, including EBPR. In addition, it can simulate clarification, sludge digestion, and sludge dewatering. BioWin is very detailed, using 36 state variables and modeling 47 separate biokinetic processes. It tracks separately the concentrations of six classes of microorganisms in the activated sludge process. A drawback of BioWin and other commercial models is that they currently lack the equations needed to simulate chemical phosphorus removal. However, BioWin allows a user to define a custom reactor, which allows user-defined rate equations and stoichiometry. JJG/EDT will use this approach to create a plant-specific model for each plant, which includes both EBPR and chemical phosphorus removal.

A commercial model such as BioWin is considered mechanistic because a fundamental understanding of the mechanisms involved was used to develop the equations for reaction rates and stoichiometry. A mechanistic model can simulate conditions that have never existed at full scale. On the other hand, an empirical model is based on reaction rates and stoichiometry that have been observed in full-scale systems. An empirical model is only valid for conditions similar to ones used to determine the behavior of the system. Typically,

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[1] BioWin32 is described in detail at www.envirosim.com.

a custom spreadsheet model is a hybrid mechanistic/empirical model. JJG/EDT is experienced in conducting plant process capacity evaluations using custom spreadsheet models. JJG/EDT will develop a custom spreadsheet model for each facility, which will be used to compare the results of the BioWin models.

JJG/EDT will begin the effort by preparing a process flow diagram (PFD) for each plant. The PFD will depict the connectivity between unit processes at the plants. A subset of the PFD will be implemented in BioWin (preliminary treatment and disinfection will not be simulated). In BioWin, parallel units will be treated as a single unit. Offline units will be handled by reducing the value of the applicable process parameter (e.g., surface area for secondary clarifiers).

A custom reactor will be defined for simulation of chemical phosphorus removal (via spreadsheet model). Essentially, this reactor will reduce the PO4-P concentration, with a corresponding increase of the inert suspended solids (ISS) concentration. The stoichiometry for this conversion will be based on previous work, either described in the literature or performed by JJG/EDT. The rate equation will be adjusted, such that the PO4-P concentration in the effluent of this reactor is equal to the target concentration for chemical phosphorus removal. Outside of BioWin, the required metal salt dose will be calculated based on the PO4-P concentrations in and out of the custom reactor. Multiple chemical feed points will be incorporated into the BioWin, to determine the best feed point to meet target limits.

To produce accurate results, the BioWin model will be calibrated using full-scale plant data. Many of the parameters in the BioWin model can vary from plant to plant, and use of BioWin's default values would produce less accurate results.

Examples of BioWin calibration include:

- Influent Parameter Speciation - For example, how influent COD is distributed (slowly biodegradable particulate, VFAs, etc.). This may require laboratory testing that is not typically performed by the City; however, it is assumed that the City's Technical Services Lab facilities can accomplish the required analyses; the cost of such testing is not included. The City's resources will also be used to assist with the limited bench-scale testing that may be required.
- Primary Clarifier Performance - TSS removal efficiency based on hydraulic loading and chemical dosages (e.g., polymer).
- Activated Sludge Process Performance - Sludge generation per pound of BOD removed. Rates of removal of BOD and ammonia, based on biomass present, effluent concentrations, and wastewater temperature. EBPR performance.
- Secondary Clarifier Performance - TSS removal efficiency based on hydraulic and solids loading and chemical dosages (e.g., polymer).
- Anaerobic Digester Performance - Rate of VSS destruction based on digester loading and temperature.
- Dewatering Centrifuge Performance - Solids capture and thickened sludge concentration.

The City has expressed an interest in modeling diurnal variations of influent flow rate and pollutant concentrations. A dynamic simulation such as this is possible using BioWin, but to produce meaningful results, it would require collection of time-variant influent data for flow, COD, TKN, etc. JJG/EDT believes that the results of a dynamic simulation would be of limited use to the City. The City's plants have monthly and weekly average effluent limits, so treatment process performance over a shorter averaging period is interesting but unimportant with respect to permit compliance, and therefore, plant capacity. However, JJG/EDT will develop a procedure for the City to model diurnal variations.

The plant-specific model will be used to determine plant capacity with respect to a set of effluent limits. As directed by the City, JJG/EDT assumes that plant capacity for each plant will be determined for the flow and effluent limits provided in the *Technical Specifications for Process Capacity Analysis for the R.M. Clayton, South River, and the Utoy Creek WRC* and the NPDES limits proposed by GA EPD for facilities in the Chattahoochee River Basin in Metro Atlanta. The effluent limits, together with the influent conditions, will be used in the process models to determine the capacity rating of the existing plants.

For each plant, a typical year will be selected, and this will define variation and peaking factors for influent flow and pollutant loads. Capacity will be based on successfully achieving the effluent limits (with a safety factor) under the following design conditions:

- Maximum month influent loads, average influent flow rate, and winter wastewater temperature. In the case of seasonal limits, the minimum wastewater temperature for each season will be used.
- Average influent loads, maximum month flow rate, and winter wastewater temperature.
- Each of these conditions, with peak influent flow occurring some time during the same month.

As part of this project, JJG/EDT will deliver the calibrated BioWin models to the City. The City may use the models for any purpose in the future. JJG/EDT will prepare an instruction manual describing use of the models. The manual will include instructions for changing influent characteristics, changing the number of parallel units that are online, and changing the settings for the custom reactor to achieve different effluent PO4-P (and therefore total phosphorus) concentrations.

Hydraulic Models

Overall plant capacity may be limited by either process or hydraulic capacity. For each plant, JJG/EDT will develop a plant-specific spreadsheet-based hydraulic model using MS Excel. The hydraulic model will be useful for identifying bottlenecks, which, if corrected, would allow higher flow rates.

The hydraulic model will trace a worst-case flow path through the plant with respect to headloss. For example, the route could follow the path having the highest headloss between a splitter box and a particular clarifier, and then continue from a different clarifier to the next splitter box.

Following development of draft hydraulic models, JJG/EDT or its subcontractor will survey critical physical and water surface elevations only within plants' boundaries. The City must provide survey data from outside the plants' boundaries - this would be important for looking at South River/Intrenchment Outfall and the impact of the Nancy Creek Tunnel on R.M. Clayton WRC. JJG/EDT will also extract information from projects by other Consultants, if provided by the City, to limit the scope of surveys. These elevations will be used to determine required modifications of the draft version hydraulic models.

The hydraulic model will take plant flow rate as an input, and it will identify situations where the model has predicted that further upstream calculations are invalid, for example a flooded weir or submerged flume.

JJG/EDT will prepare a dynamic hydraulic profile drawing for each plant; i.e., the spreadsheet-based hydraulic profile will be linked to the custom process spreadsheet model. The connection will allow hydraulic profiles to be updated for the flow rates entered in the custom process spreadsheet model (e.g., average, max month, and peak flows). The hydraulic profiles will visually depict elevations that affect water surface elevations within the plants, as well as the water surface elevations themselves, which are the outputs of the hydraulic models.

Mass Balances

Results of the process and hydraulic modeling tasks described above will be summarized in a mass balance for each WRC. The process and hydraulic spreadsheets will be linked with the mass balance for each WRC. One version of the mass balance will correspond to each modeled condition (e.g., average, max month, and peak flows). The mass balances will be formatted using the same stream numbering system as the PFD. For each stream number in the PFD, the mass balance will reflect the input flow rate, concentration, and mass of each of the following parameters:

- Soluble or total cBOD5, depending on the stream
- TSS or MLSS, depending on the stream
- Ammonia-nitrogen or TKN, depending on the stream
- Nitrate-nitrogen
- PO4-P or both PO4-P and total phosphorus, depending on the stream

Project Team

The proposed project team is comprised of individuals with considerable experience in their assigned responsibilities on this project. Brief descriptions of the project team are provided below

J.C. Lan, P.E., will serve as Project Manager of this project, in addition to overseeing the process modeling task. Mr. Lan has 21 years of experience, specializing in municipal and industrial wastewater treatment systems. As a process specialist, Mr. Lan has prepared process evaluations for facilities ranging from 7 MGD to greater than 100 MGD.

Richard Lawrence, P.E., will oversee the development of the hydraulic model. Mr. Lawrence has 25 years of experience in municipal and industrial wastewater process system design, including biological nutrient removal processes. He recently served as technical advisor and manager of the biological treatment facilities at the F. Wayne Hill Water Resources Center; the project was a 40 MGD expansion to 60 MGD.

Scott Levesque, P.E., will serve as Project Engineer for this project and he will be responsible for developing the process models of the facilities. Mr. Levesque has worked with the modeling packages Hydromantis GPS-X and BioWin to conduct process analyses to develop recommendations for improvements of various wastewater facilities.

Karen Crandall, E.I.T., will serve as Project Engineer for this project and she will be responsible for developing the hydraulic models and mass balances for the facilities. Ms. Crandall worked as an intern with the City of Atlanta Wastewater Services Department from October 1998 to December 1999. During the internship, she became familiar with the City's WRCs. In addition, she has performed hydraulic analyses and evaluations for several municipal wastewater treatment facilities.

Troy Loetzerich will serve as an Operations Specialist to evaluate the unit processes at the plants and coordinate the data collection task of the project. Mr. Loetzerich has been providing support to the operations and maintenance staff at the R.M. Clayton WRC since 1999. He has led the startup teams for all major processes during Phase 2 and Phase 3 construction at the facility. He also has conducted classroom and hands-on training on all major equipment. Mr. Loetzerich is very familiar with all the plant staff and has participated in the resolution of many design and operational issues at the R.M. Clayton facility. Mr. Loetzerich has also worked at Utoy Creek and the South River WRCs; particularly on startup activities related to the odor control systems.

George Barnes, P.E. is JJG's Client Representative for the City of Atlanta and he will guide the improvements development phase for the WRCs, providing his history of the City's wastewater treatment approaches. Mr. Barnes' experience includes 20 years as the Director of Pollution Control for the City of Atlanta. He was responsible for planning, design, construction, operation, and maintenance of three advanced secondary treatment facilities with a combined capacity of 176 million gallons per day and 12 large wastewater pumping stations, serving a population of more than 2 million.

Mark Vosburg is the Manager of Internal Software Applications with expertise in the fields of operating systems, applications, databases, networks, and web design. Mr. Vosburg will provide software and hardware technical support for the use of the modeling packages submitted by JJG/EDT under this project.

Schedule

To achieve the City's schedule objectives, the project period will be nine (9) months from the City's Notice to Proceed. The estimated project schedule is shown in Figure 1. We are prepared to proceed immediately on this project upon notification from the City. However, the City estimates the earliest issue of the Notice to Proceed will be July 5, 2002. To provide a draft summary report by December 15, 2002, as requested by the City, JJG/EDT would need to start collecting existing information on the four plants immediately. The City will arrange for JJG/EDT to do so.

Deliverables

In summary, at the end of the project, JJG/EDT will deliver the following:

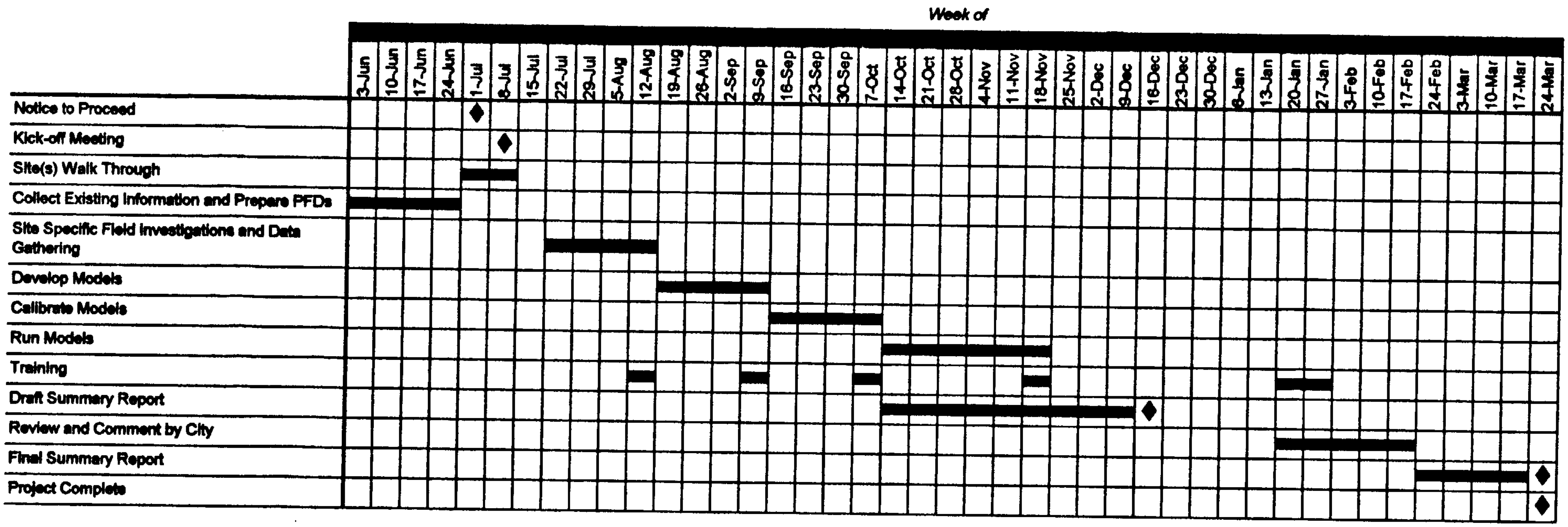
- Calibrated BioWin, hydraulic, mass balance, and process capacity analysis spreadsheet models for R.M. Clayton, South River, and Utoy Creek WRCs, as discussed under the Technical Approach section
- Instruction manual describing use of the models
- Summary report with recommendations on upgrades required to meet the various sets of effluent limits, as discussed under the Technical Approach section, proposed schedule of improvements to meet anticipated targets, and estimated construction costs
- 5-year lease for one license of BioWin

Cost

JJG/EDT will perform the proposed engineering services on a time and material basis, with a budget cost of $550,000, not to be exceeded without prior authorization from the City. This budget estimate includes a custom spreadsheet model for each plant, for comparison with the BioWin models, as discussed in the Technical Approach. The fee breakdown for this estimate is shown as Figure 2.

The budget estimate is based on using the City's Technical Services Lab (or a contract laboratory offered by the City) for sample collection and analysis, if required. Therefore, sample analyses are not included in the proposed scope of work. In addition, the budget estimate assumes that the input parameters from Brown & Caldwell's modeling task for the R.M. Clayton WRC Capacity Analysis will be provided to JJG/EDT for calibration of the BioWin model for the R.M. Clayton WRC.

FIGURE 1
GENERAL SCHEDULE



Attachment 1

FIGURE 2
FEE SUMMARY
City of Atlanta Technical Specifications for
Process Capacity Analysis for the R.M. Clayton, South River, and the Utoy Creek WRCs

Date: 05/16/02

Task	Task Description	Manhours	Hourly Rate, $	Total, $	Task Subtotal, $
1	**Gather and Review Existing Information**				18,768
	Project Director	0	157	-	
	Project Manager	24	138	3,312	
	Engineer 6	0	119	-	
	Engineer 5	24	96	2,304	
	Engineer 4	96	82	7,872	
	Engineer 3	0	70	-	
	Engineer 1	96	55	5,280	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			-	
2	**Conduct Site Evaluations**			-	37,114
	Project Director	0	157	-	
	Project Manager	24	138	3,312	
	Engineer 6	0	119	-	
	Engineer 5	168	96	16,128	
	Engineer 4	144	82	11,808	
	Engineer 3	0	70	-	
	Engineer 1	0	55	-	
	Technician	90	57	5,130	
	Admin Assistant	16	46	736	
	Other Direct Costs			-	
3	**Develop Model Kinetics and Input Data**			-	70,352
	Project Director	0	157	-	
	Project Manager	72	138	9,936	
	Engineer 6	0	119	-	
	Engineer 5	300	96	28,800	
	Engineer 4	40	82	3,280	
	Engineer 3	160	70	11,200	
	Engineer 1	80	55	4,400	
	Technician	0	57	-	
	Admin Assistant	16	46	736	
	Other Direct Costs			12,000	
4	**Process Model Development**			-	81,800
	Project Director	0	157	-	
	Project Manager	200	138	27,600	
	Engineer 6	80	119	9,520	
	Engineer 5	400	96	38,400	
	Engineer 4	40	82	3,280	
	Engineer 3	0	70	-	
	Engineer 1	0	55	-	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			3,000	

Task	Task Description	Manhours	Hourly Rate, $	Total, $	Task Subtotal, $
5	**Hydraulic Model Development**				**44,560**
	Project Director	0	157	-	
	Project Manager	40	138	5,520	
	Engineer 6	40	119	4,760	
	Engineer 5	0	96	-	
	Engineer 4	40	82	3,280	
	Engineer 3	400	70	28,000	
	Engineer 1	0	55	-	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			3,000	
6	**Mass Balance Model Development**				**17,780**
	Project Director	0	157	-	
	Project Manager	20	138	2,760	
	Engineer 6	20	119	2,380	
	Engineer 5	0	96	-	
	Engineer 4	20	82	1,640	
	Engineer 3	0	70	-	
	Engineer 1	200	55	11,000	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			-	
7	**Flow Equalization Evaluation**				**19,824**
	Project Director	0	157	-	
	Project Manager	16	138	2,208	
	Engineer 6	0	119	-	
	Engineer 5	96	96	9,216	
	Engineer 4	0	82	-	
	Engineer 3	120	70	8,400	
	Engineer 1	0	55	-	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			-	
8	**Evaluation Report**				**89,196**
	Project Director	0	157	-	
	Project Manager	112	138	15,456	
	Engineer 6	0	119	-	
	Engineer 5	400	96	38,400	
	Engineer 4	280	82	22,960	
	Engineer 3	174	70	12,180	
	Engineer 1	0	55	-	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			200	
9	**Training of City Technical Staff**				**51,004**
	Project Director	24	157	3,768	
	Project Manager	124	138	17,112	
	Engineer 6	0	119	-	
	Engineer 5	144	96	13,824	
	Engineer 4	80	82	6,560	
	Engineer 3	60	70	4,200	
	Engineer 1	40	55	2,200	
	Technician	0	57	-	
	Admin Assistant	40	46	1,840	
	Other Direct Costs			1,500	

Task	Task Description	Manhours	Hourly Rate, $	Total, $	Task Subtotal, $
10	**Final Report**				24,940
	Project Director	0	157	-	
	Project Manager	60	138	8,280	
	Engineer 6	0	119	-	
	Engineer 5	120	96	11,520	
	Engineer 4	0	82	-	
	Engineer 3	40	70	2,800	
	Engineer 1	0	55	-	
	Technician	0	57	-	
	Admin Assistant	40	46	1,840	
	Other Direct Costs			500	
11	**Coordination Meetings (City, other subconsultants)**				27,264
	Project Director	24	157	3,768	
	Project Manager	72	138	9,936	
	Engineer 6	0	119	-	
	Engineer 5	72	96	6,912	
	Engineer 4	24	82	1,968	
	Engineer 3	48	70	3,360	
	Engineer 1	24	55	1,320	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			-	
12	**12-month process evaluation technical support for the models**				23,140
	Project Director	0	157	-	
	Project Manager	40	138	5,520	
	Engineer 6	0	119	-	
	Engineer 5	120	96	11,520	
	Engineer 4	0	82	-	
	Engineer 3	80	70	5,600	
	Engineer 1	0	55	-	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			500	
13	**BioWin lease for 5 years and 5 years of technical support related to software and hardware**				44,080
	Project Director	0	157	-	
	Project Manager	40	138	5,520	
	Engineer 6	240	119	28,560	
	Engineer 5	0	96	-	
	Engineer 4	0	82	-	
	Engineer 3	0	70	-	
	Engineer 1	0	55	-	
	Technician	0	57	-	
	Admin Assistant	0	46	-	
	Other Direct Costs			10,000	
Totals		**5,604**		**$ 549,822**	

ATTACHMENT 2
EXAMPLE OF CUSTOM SPREADSHEET MODEL USED BY JJG FOR PLANT PROCESS CAPACITY EVALUATIONS

Project	BERGEN COUNTY WWTP	Acct. No.		Page	
	MAX. MONTH LOAD CONDITION	Comptd By	J. C. LAN	Date	2/16/99
Detail	CURRENT OPERATION	Ck'd By		Date	

A. RAW WASTEWATER CHARACTERISTICS:

		TRAIN A/B Max Month CONDITION	TRAIN C/D Max Month CONDITION
Flow,	MGD	42.0	56.5
	gpm	29167	39236
COD*,	mg/l	470	470
	lbs/d	164632	221469
BOD5,	mg/l	235	235
	lbs/d	82316	110734
TSS,	mg/l	245	245
	lbs/d	85819	115446
VSS*,	mg/l	221	221
	lbs/d	77237	103902
TKN,	mg/l	26	26
	lbs/d	9107	12251
NH3-N,	mg/l	16	16
	lbs/d	5604	7539
PO4-P,	mg/l	4	4
	lbs/d	1401	1885
FSS	mg/l	25	25
	lbs/d	8582	11545
NDVSS	mg/l	37	37
	lbs/d	12873	17317

* ASSUMED VALUE

B. BAR SCREEN EFFLUENT CHARACTERISTICS:

		TRAIN A/B	TRAIN C/D
Flow,	MGD	42.0	56.5
	gpm	29167	39236
COD,	mg/l	470	470
	lbs/d	164632	221469
BOD5,	mg/l	235	235
	lbs/d	82316	110734
TSS,	mg/l	245	245
	lbs/d	85819	115446
VSS	mg/l	221	221
	lbs/d	77237	103902
TKN,	mg/l	26	26
	lbs/d	9107	12251
NH3-N,	mg/l	16	16
	lbs/d	5604	7539
PO4-P,	mg/l	4	4
	lbs/d	1401	1885
FSS	mg/l	25	25
	lbs/d	8582	11545
NDVSS	mg/l	37	37
	lbs/d	12873	17317

C. PRIMARY CLARIFIER PERFORMANCE

1. Number of primary clarifiers	8	8
2. Detention time, hr (typical range = 1.5 - 2.5 hr)	1.1	0.8
2. Surface overflow rate, gpd/ft2 (typical range = 800-1200 gpd/ft2, peak = 2000-3000 gpd/ft2)	1591	2118
4. Total Clarifier Surface Area, ft2	26400	26680
5. Clarifier depth, ft	9.5	9.5

6. Primary effluent characteristics

Flow,	MGD	42.0	56.5
	gpm	29167	39236
COD,	mg/l	320	320
	lbs/d	111949	150599
BOD5,	mg/l	167	167
	lbs/d	58444	78621
TSS,	mg/l	121	121
	lbs/d	42279	56875
VSS	mg/l	109	109
	lbs/d	38051	51187
TKN,	mg/l	23	23
	lbs/d	8056	10838
NH3-N,	mg/l	16	16
	lbs/d	5604	7539
PO4-P,	mg/l	3	3
	lbs/d	1051	1414
FSS	mg/l	12	12
	lbs/d	4228	5687
NDVSS	mg/l	2	2
	lbs/d	570	767

D. DESIGN CONDITION:

1. Site Conditions:

Elev. above sea level, ft			50
Temp. of waste			
	summe	F	78
		C	26
	winter	F	55
		C	13
Ambient temp.			
	summe	F	85
		C	29
	winter	F	20
		C	-7

2. Reaction Kinetics:

k, mg BOD/mg VSS-day					
summer			18.47		
winter			13.32		
Y, mg VSS/mg BOD			0.6		
kd, 1/day					
summer			0.076		
winter			0.041		
Ks, mg/l			60		

E. PERFORMANCE ASSUMPTIONS:

1. Return sludge flow rate to the stabilization tanks, gpm				
summer	14583	(R=0.5)	(R=0.5)	19618
winter	14583	(R=0.5)	(R=0.5)	19618
2. MLVSS/MLSS ratio of the contact tanks				
summer	0.87			0.87
winter	0.87			0.87
3. MLSS of the contact tanks, mg/l				
summer	2150			2150
winter	2150			2150

F. SECONDARY CLARIFIER EFFLUENT CHARACTERISTICS

1. BOD (soluble), mg/l		
summer	4.3	4.3
winter	6.0	6.1
2. VSS,mg/l		
summer	26.1	26.1
winter	26.1	26.1
3. BOD (total), mg/l		
summer	30.4	30.4
winter	32.1	32.2
4. TSS, mg/l		
summer	30.0	30.0
winter	30.0	30.0

G. CONTACT TANK

1.Total volume of contact tanks, mgals.	2.97	3.97
2. Number of contact tanks	3	4
3. Water depth, ft.	14.25	14.25
4. Hydraulic retention time of the contact tanks, days	0.07	0.07

5. Mean cell residence time of the contact tanks, days

summer	1.5	1.5
winter	1.5	1.4

6. F/M ratio of the contact tanks, mg BOD/mg VSS-d

summer	1.23	1.24
winter	1.21	1.22

7.MLVSS of the contact tanks, mg/l

summer	1871	1871
winter	1871	1871

H. STABILIZATION TANK

1.Total volume of stabilization tanks, mg	2.97	2.97
2. Number of stabilization tanks	3	3
3. Water depth, ft.	14.25	14.25

4. Hydraulic retention time of the stabilization tanks, days

summer	0.1	0.1
winter	0.1	0.1

5. MLSS of the stabilization tanks, mg/L

summer	6300	6300
winter	6300	6300

6. Mean cell residence time of the stabilization tanks, days

summer	4.4	3.3
winter	4.3	3.2

7.MLVSS of the stabilization tanks, mg/l

summer	5481	5481
winter	5481	5481

I. VERIFICATION OF PERFORMANCE ASSUMPTIONS:

1. MLVSS/MLSS RATIO

summer	0.86	0.86
winter	0.87	0.87

2. MLSS in the contact tanks, mg/l

summer	2150	2150
winter	2153	2153

J. SECONDARY CLARIFIER PERFORMANCE

1. Number of clarifiers	8	8
2. Surface overflow rate, gpd/ft2	835	1123

(typical range = 400-800 gpd/ft2, peak = 1000-1200 gpd/ft2)

3. Solids loading rate, lbs/hr-ft2	0.94	1.26

(typical range = 0.8-1.2 lbs/hr-ft2, peak = 2.0 lbs/hr-ft2)

4. Total Clarifier Surface Area, ft2	50320	50320
5. Clarifier SWD, ft	12	12

K. RETURN SLUDGE

1. Sludge volume index, ml/l	160	160
2. Clarifier underflow sludge concentratic	6250	6250
3. Return sludge flow rate, mgd		
summer	21.00	28.25
winter	21.00	28.25

L. WASTE PRIMARY SLUDGE

1. Waste primary sludge, lbs/d	43540	58572
2. Waste primary sludge flow rate, gpm	181	244
3. Waste primary sludge concentration, % solids	2.0	2.0

M. WASTE SECONDARY SLUDGE

1. Excess sludge production rate , lbs/d		
summer	35227	47424
winter	36683	49354
2. Waste sludge from WAS pump, lbs/d		
summer	24719	33288
winter	26174	35218
3. Waste sludge flow rate, gpm		
summer	329	443
winter	349	469
4. Waste sludge Concentration, % solids		
summer	0.63	0.63
winter	0.63	0.63

N. REACTOR TANK AERATION REQUIREMENTS (BASED ON 9" FINE BUBBLE AERATOR):

1. Actual O2 Req'd, lbs/hr		
summer	2610	3510
winter	2610	3510

2. AOR/SOR Correction

summer			0.322	(based on 26 C)
winter			0.332	(based on 13 C)
	alpha factor	0.45		
	beta factor	0.95		
	residual DO, mg/l	2		

3. Std. O2 Req'd, lbs/hr		
summer	8112	10910
winter	7853	10562
4. Air Req'd for O2 transfer, scfm		
summer	29575	39776
winter	28632	38508
5.Air Req'd, icfm		
summer	27652	37189
winter	26770	36003
6. Number of Diffuser required (based on 1.5 scfm/difuser)		
summer	19717	26517
winter	19088	25672
7. Total number of Diffuser installed in each tank		
	unknow	unknow
8. Addition al diffuser required		
summer	#VALUE!	#VALUE!
winter	#VALUE!	#VALUE!
9. Area of diffuser per tank, ft^2	#VALUE!	#VALUE!
10. Area of each aeration tank, ft^2	9300	9300
11. AT/AD ratio in the aeration tank (Increasing diffuser density may reach a point of diminishing return when AT/AD below 8)	#VALUE!	#VALUE!
12. Blower BHP required		
	260	350
13. Each blower installed, scfm	45000	45000
14. Number of blower installed	1	1
15. Number of blower required	0.7	0.9

O. PRIMARY SLUDGE THICKENER

1. Number of sludge thickeners	4
2. Solids loading rate, lbs/ft2-day	
(typical range = 18 - 28 lbs/ft2-day for primary sludge, w/o polymer addition)	
(typical range = 8 - 16 lbs/ft2-day for primary/secondary combined sludge)	
summer	7.7
winter	7.7
3. Hydraulic loading rate, gal/ft2-day	
(typical range = 600 - 750 gal/ft2-day)	
summer	46
winter	46
4. Addition water required, gal/ft2-day	
summer	554
winter	554
5. Water required, gpm	
summer	5103
winter	5103
6. Total surface area, ft2	13267
7. Diameter, ft	65
8. Thickener underflow sludge, lbs/d	
summer	91901
winter	91901
9. Thickener underflow rate, gpm	
summer	174
winter	174
10. Underflow sludge concentration, % solids	
(typical range = 5% - 10% for primary sludge)	
(typical range = 2% - 8% for primary/secondary combined sludge)	
summer	4.39
winter	4.39
11. Waste sludge in the supernatant, lbs/d	
summer	10211
winter	10211
12. Supernatant flow rate, gpm	
summer	5353
winter	5353

P. SECONDARY SLUDGE CENTRIFUGE THICKENER

1. Number of sludge thickening centrifuges		2
2. Thickener underflow sludge, lbs/d	summer	52206
	winter	55253
3. Thickener underflow rate, gpm	summer	124
	winter	131
4. Underflow sludge concentration, % solids	summer	3.52
	winter	3.52
5. Waste sludge in the centrate, lbs/d	summer	5801
	winter	6139
6. Centrate flow rate, gpm	summer	649
	winter	687

Q. COMBINED THICKEN SLUDGE

1. Combin thickened sludge, lbs/d	summer	144106
	winter	147154
2. Combin thickened sludge flow rate, gpm	summer	298
	winter	305
3. Combin thickened sludge concentration, % solids	summer	4.03
	winter	4.02

R. ANAEROBIC DIGESTER AND DIGESTED SLUDGE

1. Diameter of each anaerobic digester, ft		80
2. Side water depth, ft		32.0
3. Work volume of each standard rate anaerobic digester, mgals.	mgals	1.20
	cu ft	160768
4. Number of standard rate anaerobic digester		5

5. Solids loading rate, lb VSS/day/cu ft
(typical range = 0.04 - 0.1 lb VSS/day/cu ft for standard rate anaerobic digester)

summer	0.16
winter	0.16

6. Solids retention time, days
(typical range = 30 - 60 day)

summer	14.0
winter	13.7

7. Percent VSS destructed

summer	37.0
winter	36.8

8. Waste Digested sludge VSS portion, lbs/d

summer	77160
winter	78999

9. Waste Digested sludge, lbs/d

summer	98776
winter	101072

10. Digested sludge VSS/TSS ratio

summer	0.78
winter	0.78

11. Waste digested sludge flow rate, gpm

summer	298
winter	305

12. Waste digested sludge concentration, % solids

summer	2.76
winter	2.76

S. GAS PRODUCTION

1.Gas produced per lb of VSS destroyed, cu ft/lb of VSS
10.327

2. Total gas produced from all of the anaerobic digester, kft3/day

summer	46812
winter	47588

3. Total BTU value at standard condition, BTU/day*10000000

summer	31364
winter	31884

T. SLUDGE CAKE PRODUCTION

1.Sludge cake (assume 91.2% cap.) , dry ton/day
45.04
46.09

TRANSMITTAL FORM FOR LEGISLATION

TO: MAYOR'S OFFICE

ATTN: GREG PRIGDEON

Commissioner's Signature FOR

Director's Signature

Originating Department: Public Works

Contact Person: Keith Brooks X 6382

Committee(s) of Purview: City Utilities

Council Deadline: May 31, 2002.

Committee Meeting Dates(s): June 11-12, 2002

Full Council Date: June 17, 2002

CAPTION

A RESOLUTION AUTHORIZING THE MAYOR OR DESIGNEE TO APPROVE A NOTICE TO PROCEED WITH JORDAN, JONES AND GOULDING, INC./ENGINEERING DESIGN TECHNOLOGIES, INC., - JV FOR FC-6710-96D, ANNUAL CONTRACT FOR ARCHITECTURAL AND ENGINEERING SERVICES TO PERFROM A PROCESS CAPACITY ANALYSIS OF THE THREE (3) CITY NPDES PERMITTED WATER RECLAMATION CENTERS ON BEHALF OF THE DEPARTMENT OF PUBLIC WORKS IN AN AMOUNT NOT TO EXCEED FIVE HUNDRED FIFTY THOUSAND DOLLARS ($550,000.00); ALL CONTRACTED WORK SHALL BE CHARGED TO AND PAID FROM FUND, ACCOUNT AND CENTER NUMBER: 2J21 524001 M57201.

BACKGROUND

TO PERFROM PROCESS CAPACITY ANALYSIS FOR R.M. CLAYTON, SOUTH RIVERS AND UTOY CREEK WRC'S.

FINANCIAL IMPACT (if any) **$550,000.00**

Mayor's Staff Only

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Received by Mayor's Office: 5/31/02 (date)

Reviewed by: (initials) (date)

Submitted to Council: ______________ (date)

Action by Committee: ____Approved ____Adversed ____Held ____Amended

____Substitute ____Referred ____Other